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ABSTRACT

This guide is intended to help vocational and mathematics teachers design and implement integrated mathematics-vocational education courses. The guide is organized in six sections. Following two sections containing information about the project in which the guide was developed and how to use the guide, Section III provides guidelines for organizing a mathematics equivalency credit program. Examples of course sequences provide the user with direction in selecting credit sequences. Mathematical applications by content units are provided in matrix format in Section IV. This section is divided into two parts. Part A provides a sample matrix of mathematical applications by content units in the three pilot programs involved in the project. This matrix provides examples of mathematical applications being made by teachers in Corvallis, Oregon, where the project was developed. Part B is a mathematics checklist. Completion of the checklist is the critical part of the process for integrating mathematics into vocational courses and is intended as a team effort for vocational and mathematics teachers. Section V of the guide is a list of suggested resources. The final section (appendixes) contains three examples of matrixes showing applications by courses, by program area, and by content units; an equivalency credit application; and a notice to staff regarding student registration procedures. (KC)

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IMPLEMENTATION GUIDE

FOR

" AN INTEGRATED VOCATIONAL EDUCATION AND MATH SKILLS MODEL"

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Special thanks are extended to the mathematics and vocational education staff who spent many hours in discussing the specific details of integrating mathematics into vocational education. That process was invaluable in establishing the cooperative relationships needed for implementing this program.

Support by central office administration and high school principals is essential to the success of this type of project. Their commitment and support of the project is most commendable.

GLOSSARY OF TERMS

CREDIT	One credit is awarded for one semester of completed work.
MATH REQUIREMENT	Four math credits are required for high school graduation.
PROGRAM CERTIFICATION	A process to determine the courses to be included in a two-year sequence of vocational courses making up a vocational program and appropriate for math equivalency credit.
REVIEW BOARD	Persons identified to review math equivalency credit applications and to determine the integrity of previously approved course sequences.

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I. INTRODUCTION

The national focus on academic excellence has resulted in increased requirements in mathematics and other academic subjects. Most students learn best in a traditional class where sequenced instruction in mathematical concepts is presented. Another segment of the student population learns concepts more readily through math applications within a subject of career interest. Both options for delivery of math instruction should be available to students.

Applications of mathematical concepts are an integral part of instruction in vocational courses. In most vocational classes, the math component is integrated into subject matter units. Some vocational programs offer a course in mathematics, such as Business Math, as well as integrated applications throughout all courses. The breadth and depth of mathematical applications will vary between programs.

The increased academic requirements have tended to reduce enrollments in elective courses, including vocational education classes. As elective class enrollments decline, many program options are eliminated on the basis of cost effectiveness. In order to maintain balanced curricula, schools are looking toward approaches that integrate math into vocational and technical courses. This raises a philosophical question among both mathematics and vocational instructors. Will students receive sufficient mathematics in a sequence of vocational courses to justify credit in mathematics? All agree that math applications are an appropriate method of learning if the essential concepts are included in the applications.

This project is directed toward identifying the specific mathematical concepts that are taught in the various vocational programs; defining combinations of courses that offer sufficient applications to deserve math credit; defining approaches to math that have the support of mathematics and vocational instructors; and establishing criteria for granting credit for math received in a vocational class.

Two products were developed as a result of this project, an implementation guide and an inservice guide.

- Implementation Guide for "An Integrated Vocational Education and Math Skills Model."
- Inservice Guide for "An Integrated Vocational Education and Math Skills Model."

II. HOW TO USE THIS GUIDE

Section III, Program Organization, provides guidelines for organizing a math equivalency credit program. Examples of course sequences provide the user with direction in selecting credit sequences.

Mathematical applications by content units are provided in matrix format in Section IV, The Applications of Mathematical Concepts. This section is divided into two parts. Part A provides an example matrix of mathematical applications by content units in the three pilot programs involved in the project. This matrix provides examples of math applications being made by Corvallis teachers. Once the reader has gained some ideas from the examples, the math checklist, Part B should be completed. Completion of the checklist is the critical part of the process for integrating mathematics into vocational courses. This activity should be conducted as a team effort with vocational/math teachers meeting jointly. With this approach, the specific math concepts will be discussed and evaluated in relation to the vocational curriculum and determinations made regarding math equivalency credit.

Resources listed in Section V should be reviewed by districts interested in implementing math equivalency credit.

Several items have been included in the appendices of this guide. These are intended as resources to complement further understanding of math credit equivalency. Matrix formats for program analysis show other methods for summarizing checklist data. A completed checklist for math applications in the replication programs might be of interest to trades and industrial teachers. An application for math equivalency credit is found in Appendix D.

The implementation guide can be utilized by other school districts that are grappling with math integration into vocational courses. The matrices will serve as guidelines for conducting an analysis of vocational courses to determine the degree to which math applications are being made in a program or course. Likewise, it can serve as a checkpoint for vocational teachers who wish to strengthen the math component of a vocational class. Math teachers can utilize the guide as a reference for bringing applications into their regular math courses.

School planners and/or decision-makers should find this guide helpful in determining if credit should be given for math applications in vocational programs; establishing criteria for awarding math credit; and in organizing an integrated math program. Other districts can benefit from the details that were worked out in this pilot program.

III. PROGRAM ORGANIZATION

Standards for determining math equivalency credit must be established and carefully monitored to assure a continuance of quality instruction. The program must be organized in a way that math applications occur by design rather than by happenstance.

Each vocational program must be examined for its math applications. Programs are approved according to the applications of mathematical concepts made within the sequence of classes within a two-year program.

This project has defined some guidelines for implementing and operating math equivalency credit programs (integrated math). The guidelines resulted from problems, constraints and successes of the project. Other schools who wish to implement similar programs should consider the following:

1. The leadership for an integrated math program should arise from mathematics teachers, vocational instructors and school administrators.

2. A math skills checklist should be utilized as a benchmark for relating mathematics and vocational education. The skills checklist breaks mathematics into its many concepts.

3. Standards must be established for controlling the quality of math instruction in vocational classes. Written guidelines for program certification and monitoring must be developed.

A. Criteria for Selecting and Approving a Program for Math Equivalency Credit

A series of courses make up a two-year vocational program. Each courses in the two-year sequence is evaluated according to the application of mathematics concepts. The selection of course sequences is based on the analysis using the math checklist.

Guidelines for establishing math equivalency credit are explained in detail below. All elective programs/courses for which equivalency credit is to be considered, must make application to the review committee.

1. Vocational program must be a district approved vocational program (two years). The sequence of courses are clearly defined and have been approved by the review team. Math credit will only be given for completion of a series of courses that have been approved for the math credit.

2. Curriculum includes math daily (a minimum of one-quarter of time in the sequence) in one of the following ways:

   a. reviewing or introducing math skills; and/or
   b. using math applications.

3. Math concepts are clearly defined in writing.

4. Vocational staff involved in the program must have a strong commitment to teaching mathematics as an integral part of their curriculum.

5. Minimum math concepts have been clearly defined utilizing the Math Task Checklist. There are 134 items on the checklist; 40 items must receive a 3 rating; 77 items must be rated 2 or 3. Only 17 items can be missing from an approvable course sequence.

B. Equivalency Credit Process for Approval

1. All elective programs for which equivalency credit is to be considered must make application to the review committtee. (see item #7 below and Appendix D)

2. At the time of application a representative from the core area will be assigned to work with the elective program applicant through the review process.

3. The equivalency credit applicant must meet with the core department for input on completing the math equivalency credit checklist.

4. If the application involves a program that has received prior approval at another school in the district, approval will be granted provided there is verification the curriculum will be the same.

5. The equivalency application form and the math equivalency checklist can be picked up by the applicant from the building principal, assistant superintendent or the district vocational curriculum coordinator.

6. All building principals impacted by the application will be informed by the coordinator of the initiated application.

7. The review committee will consist of the :

   a. district subject area curriculum specialist;
   b. building administrator (preferably the person responsible for the core curriculum area);
   c. core teacher representative;
   d. elective program teacher; and
   e. curriculum coordinators, vocational and/or secondary.

8. Deadlines for submitting requests:

   o End of November - Initial request, review started.
   o Middle of January - Decision, adjustments identified.
   o Middle of February - Final review, approval.

C. Course Sequences for Math Equivalency Credit

Math equivalency credit options must be clearly defined in the school catalog. The following example was taken from the Crescent Valley High School Catalog.

Math Equivalency Credit Program

Math/Drafting	Course 601	Prerequisites - None
Math/Office Occupations	Course 602	Prerequisites - None
Math/Accounting	Course 603	Prerequisites - None
Math/Electricity-Electronics	Course 604	Prerequisites - None
Math/Home Economics	Course 605	Prerequisites - None
Math/Auto Mechanics	Course 606	Prerequisites - None

An integrated math program is designed to allow math credit for students enrolled in certain vocational programs. To qualify for one math credit, a student must complete an approved vocational program in one of the above areas. The student will be awarded the math credit upon completion of the approved sequence of courses. (Listed below). To sign up for this program, a student must sign up for the special course designation which has math included in the name along with the vocational program.

ONLY ONE MATH CREDIT OF THE FOUR REQUIRED FOR GRADUATION MAY BE EARNED THIS WAY.

Drafting - Two years. Any combination of Drafting I, II, III, IV or Architecture.

Office Occupations - Office Procedures (one year), Business Machines (one semester), Accounting I (one semester).

Accounting - Accounting I (one year), and one year of Accounting II or Accounting III.

Electricity-Electronics - Any combination of four semesters of : Basic Electricity I, II; Electricity/Electronics III, IV; Advanced Electronics V, VI; Senior Electronics VII, VIII.

Home Economics - One semester each of Basic Foods, Advanced Foods and Living on Your Own and one semester of either Basic Sewing or Individualized Sewing.

Auto Mechanics - Career Mechanics (one year) and two semester of any combination of: Auto I (one year), Auto II (one year), and Career Mechanics (second year).

D. Process for Student Registration

Counselors are a critical part of managing, advising and recording student activities. First, a computer number should be assigned for the math equivalency credit of each program. This number is listed on all registration materials and in student catalogs.

Orientation programs involve counselors, math and vocational education staff. Counselors advise students through 8th and 9th grade orientation sessions. Informational posters are placed in classrooms and in strategic locations around the building. Parents are advised of the program at 8th grade parent night, through parent newsletters and ninth grade orientation sessions. Other staff members are advised in general faculty meetings, department meetings and through curriculum fliers. Counselors need to be regularly up-dated as to the status of approved course sequences and any changes in the program.

Counselors are critical to the registration process. They make sure that the course catalog contains all information that is pertinent to the math section and vocational programs. The catalog should include a program description and an equivalency credit number. Counselors should follow-up the student registration with a memo having staff verify that all students who wish to participate in the program are registered (see Appendix E).

E. Maintaining Quality

Project staff outlined three steps to be followed to maintain the integrity and quality of the integrated math project. First, teachers of math equivalency courses must include the continued maintenance of course as a goal to be evaluated every two years by the building principal. The second step involves an informal

assessment during the odd year consisting of an occasional contact between the equivalency credit teacher and review committee members to assess whether program standards are being maintained. The third step deals with staff turnover. When either core or equivalency staff turnover occurs, the new teacher should be given an orientation to the math equivalency credit process and secure commitment to the implementation of this approach.

F. Course Sequence Requirements

Vocational courses vary in their applications of math concepts. Each series of classes that make up a program must be carefully evaluated. The math credit will only be given for completion of a series of classes that have been certified for integrated math credit. The following course lists (by school and program area) show the sequences needed for integrated math credit.

Crescent Valley High School

Drafting

Any two year combination of Drafting I, II, III, Drafting IV (CAD) or Architecture

Accounting

Accounting I (one year), and one year of Accounting II or Accounting III

Office Occupations

Office Procedures (one year), Business Machines (one semester), and Accounting I (one semester)

Electricity/Electronics

Any combination of four semesters of: Basic Electricity I, II; Electricity/ Electronics III, IV; Advanced Electronics V, VI; Senior Electronics VII, VIII

Mechanics

Career Mechanics (One Year) and two semesters of any combinations of: Auto I (One Year) Auto II (One Year)

Consumer Homemaking

One semester each of Basic Foods, Advanced Foods and Living on Your Own; and one semester of either Basic Sewing or Individualized Sewing.

Corvallis High School

Drafting

Any two year combination of Drafting I, II, III, Drafting VI (CAD) or Architecture.

Accounting

Accounting I, II
(One year each)

Office Occupations

Office Procedures (one year),
Business Machines (one semester), and
Recordkeeping/Accounting (one semester)

Electricity/Electronics

Any combination of four semesters of: Basic Electricity I, II; Electricity/ Electronics III, IV; Advanced Electronics V, VI; Senior Electronics VII, VIII

Mechanics

Advanced Mechanics (One Year)
and two semesters of any combination of:
Auto I (Semester), Auto II (Semester),
and Car Care (Semester)

Consumer Homemaking

One semester each of Exploring Childhood, Living on Your Own and Sewing Lab; and one semester of either Basic Foods or Advanced Foods

Woods

Rec. Woods (semester),
Advanced Woods (1 year), and
Spartan Craftsman (semester)

IV. APPLICATIONS OF MATHEMATICAL CONCEPTS

The level of math applications in a specific vocational course or program is difficult to determine. Most application math is taught in relationship to other skill building instruction. All too often, the instructor is not aware of the delivery of math instruction because the main focus is on a vocational skill. The participants of this project analyzed their programs in relationship to a list of mathematical concepts.

The matrix in Part A of this section was used to analyze the math applications within each vocational course. As a vocational teacher works through the matrix with a math teacher, the depth and breadth of math applications are identified and evaluated. At the same time, the two staff members identify where specific math concept units are being applied. The matrix in part B of this section shows math applications by content units within each major program area. Instructors identify the units of instruction in which applications of specific math concepts are made.

The teacher teams' final action is to prepare an analysis of the checklist in Part A and select a sequence of courses which best meet the program criteria. A synthesis matrix of the course sequence is totaled (see Part C). This is presented to the review team for their approval and awarding of math equivalency credit.

For the convenience of the user, a blank matrix of all three parts are found in the appendices. Also included in the appendix is the Corvallis School District's math by content unit matrix.

A. MATH APPLICATION BY CONTENT UNIT

- ACCOUNTING
- OFFICE OCCUPATIONS
- DRAFTING

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
* A. BASIC ARITHMETIC SKILLS			
*1. WHOLE NUMBERS	Balance Sheet Income Statement Invoices	All Office Procedures Units Calculator Unit	3-View Drawings Layout
*2. FRACTIONS	Depreciation Partnership/ Net Income Interest	Payroll, Timecards Calculator Unit	3-View Drawings Layout
*3. DECIMALS	Money Problems Discounts	Per Diem, Travel Expenses Telecommunications Expenses Catering Meetings/Expenses Calculator Unit/Payroll/ Purchasing	3-View Drawings Layout
*4. PERCENT	Depreciation	Payroll Trade Discounts Calculator Units/Discounts, Mark-ups, Mark-downs	Charts and Graphs

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
*5. FRACTION/DECIMAL/PERCENT	Depreciation Payroll	Interest Trade and Chain Discounts Calculator Units	Basic Layout Charts and Graphs
*6. ORDER AND EQUALITY RELATIONS	Accounting Equation Interest Rates	Increase or Decrease on Sales (Discounts Mark-ups, Mark-downs) Data Processing Calculator Units Prorating	Dimensioning
7. INTEGERS	Net Income/ Net Loss	Negative Balances Charts and Graphs	Charts and Graphs
8. IRRATIONAL & COMPLEX NUMBERS			Geometric Construction

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
B. MEASUREMENT			
*1. MEASUREMENT TOOLS		Postage Scales Format Typing/Keyboarding Format Ruler Ruler	Multiview Drawings
2. EXTENDED MEASUREMENT TOOLS	Automated Recounting Worksheets	Word Processing Microcomputer	CAD Drafting
*3. APPROXIMATION	Budgeting	Typing/Keyboarding Page/Envelope Formatting Budgeting	Charts and Graphs
*4. MEASUREMENT SKILLS		Office Dimensioning Page Formatting	Multiview Drawings Geometric Construction Surveying

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
5. UNITS OF MEASUREMENT	Payroll Money Problems	Reprographic Counters Postage Meter Type Pitch Page Formatting Money Problems/Payroll	Multi-view Drawings
C. COMMUNICATIONS			
1. TECHNICAL WRITING	Budget Expenses Financial Statement Annual Report Posting	Budgets Expenses Financial Statement Balance Sheets Report Format Memos and Letters Charts, Graphs	Budget/Plan Cost Gathering Field Data Cost Analysis Charts, Graphs
2. EXTENDED PROJECT - long term problem solving project and formal report	Accounting Cycle Simulations Practice Sets	Simulations: Word Processing Calculator Typing In-basket Office Procedures Data Processing	Architecture

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
*3. READING AND INTERPRETATION	Spread Sheets Variable/Fixed Costs Breakeven Analysis Worksheets	Sales Tax Payroll Balance Sheet Inter-Office Memos Data Processing Equipment Instruction Manuals Written Instructions Terminology--all units	Charts and Graphs Field Data
*4. ORAL COMMUNICATION	Key Terms Throughout All Units	Give and Follow Oral Instructions, including Feedback--All Units Terminology--All Units	Question and Answer in All Units
D. BASIC COMPUTATIONAL SKILLS			
*1. COMPUTATION (Four basic functions)	Net Income/ Net Loss Accounting Equation Money Problems Budgeting	All Units	All units
*2. FRACTIONS, PERCENTS AND DECIMALS	Depreciation Notes Payroll	Discounts, Mark-ups, Mark-Downs Calculator Units	Multi-view Drawings

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
*3. MONEY PROBLEMS	Payroll Net Income Cost of Goods	Unit Costs Payroll Office Expenses/Budget Petty Cash Calculator Units	
*4. EXTENDED CALCULATION SKILLS	Computerized Accounting Cycle and use of Calculator to solve Problems	Calculator Memory Unit Payroll Registers Tax Statements Check Registers Mark-Ups/Mark-Downs Invoices	
E. BASIC ALGEBRA SKILLS			
*1. FORMULAE	Accounting Equation	Accounting Interest Payroll Figuring WPM/DPM Margins/Page Formatting	Geometry of Technical Drawings Basic Layout
2. ALGEBRA SKILLS	Accounting Equation		Geometry of Technical Drawings Basic Layout

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
*3. EXPONENTIATION		Calculator Units	Geometry of Technical Drawings Basic Layout
F. PROBABILITY AND STATISTICS			
*1. BASIC PROBABILITY AND STATISTICS	Depreciation	Typing, Business Machines and Office Procedures (Averages Only)	
2. ANALYSIS	Financial Statement Analysis (Acctg III)		
G. BASIC GEOMETRY SKILLS			
*1. INFORMAL GEOMETRY		Modular Office Layout Space, Proportions, Lines	Theorems Congruence Similiarity Corresponding Auxillary Views

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
2. EXTENDED GEOMETRY SKILLS			X-Y Axis
H. REASONING			
*1. PROBLEM SOLVING	Trial Balance	Unit Costs Payroll Taxes Bank Reconciliation	Architecture
*2. CRITICAL THINKING	Financial Statement Analysis	Page Formatting Mailing and Shipping Itineraries Telecommunications	Surface Development Intersections
3. ANALYSIS	Accruals/Depreciation Uncollectable Accounts	Accounting and Recordkeeping Problems	Surveying Triangulation Isometric Drawing Mapping

A. MATH APPLICATION BY CONTENT UNIT

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED		
	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
4. ADVERTISING	Expense Analysis Intangible Assets	Expense Analysis	Rendering Drawing Tax Write-off Architecture

B. MATH EQUIVALENCY CHECKLIST

* This checklist is provided for instructors to analyze their own curriculum in relation to the math applications being made in vocational courses.

* The instructor should write in the names of specific courses in the vertical blocks at the top of checklist. The names of programs can be shown in the horizontal block at the top of the checklist. Rate each item according to the scale shown under Math Topics.

* See example below:

MATH TOPICS 0 = Not applicable 1 = Applicable, but not being taught 2 = Taught, but minimum depth and regularity 3 = Taught, maximum depth	ACCOUNTING			OFFICE OCCUPATIONS				DRAFTING				
	ACCOUNTING I	ACCOUNTING II	ACCOUNTING III	BUSINESS MACHINES	ACCOUNTING (1 semester) or	RECORDKEEPING	OFFICE PROCEDURES	DRAFTING I	DRAFTING II	DRAFTING III	DRAFTING IV (CAD)	ARCHITECTURAL DRAFTING
* A. BASIC ARITHMETIC SKILLS												
*1. WHOLE NUMBERS												
* Add	3	3	3	3	3	3	3	3	3	3	3	3
* Subtract	3	3	3	3	3	3	3	3	3	3	3	3

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS 0 = Not applicable 1 = Applicable, but not being taught 2 = Taught, but minimum depth and regularity 3 = Taught, maximum depth												
* A. BASIC ARITHMETIC SKILLS												
*1. WHOLE NUMBERS												
* Add												
* Subtract												
* Multiply												
* Divide												
*2. FRACTIONS												
* Add												

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS												
* Subtract												
* Multiply												
* Divide												
* Reduce												
* Change improper -- mixed (i.e. $\frac{22}{16}" = 1\frac{3}{8}"$)												
* Identify equivalent (i.e. $\frac{6}{8}" = \frac{3}{4}"$)												
*3. Decimals												
* Add												

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
* Subtract							
* Multiply							
* Divide							
* Significant units (i.e. to the nearest 0.1")							
* Repeating (i.e. $\frac{1}{3}$ = 0.333.....)							
*4. PERCENT							
* Find the percent of a whole							
* Find what percent is a number of the whole							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
*5. FRACTION/DECIMAL/PERCENT						
* Change fraction to decimal (i.e. $\frac{1}{4}$ = .25)						
* Change fraction to percent (i.e. $\frac{1}{4}$ = 25%)						
* Change decimal to fraction (i.e. .125 = $\frac{1}{8}$)						
* Change decimal to percent (i.e. .34 = 34%)						
* Change percent to fraction (i.e. 60% = $\frac{3}{5}$)						
* Change percent to decimal (i.e. 86% = .86)						
*6. ORDER AND EQUALITY RELATIONS						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
* Equivalent (i.e. A = l x w)						
* Greater than (tolerance)						
* Less than (tolerance)						
* Intervals (gaps and spacing)						
7. INTEGERS						
- Positive and negative numbers						
- Computation with positive &negative numbers						
8. IRRATIONAL & COMPLEX NUMBERS						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
* Square roots						
- Pi						
- Natural E (e = 2.781..., natural logs)						
- Complex number ($3 + \sqrt{-.7}$)						
B. MEASUREMENT						
*1. MEASUREMENT TOOLS						
* Common, non-professional tools (compass, gap meters, transit)						
* Linear scales (tape, yardstick)						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
* Verniers (micrometers, calipers)						
* Gauges (weight scales, pressure scales)						
* Non-linear tools (protractor)						
* Volume (gallon bucket, graduated cylinder)						
* Area (tiles, overlays)						
2. EXTENDED MEASUREMENT TOOLS						
- Basic computer operation						
- Computer simulation						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
- Use and selection of software						
- Spread sheets						
- Data management						
*3. APPROXIMATION						
* Measurement (pacing, hand measurement)						
* Calculation (12" x 28" = 10 x 30 = 300 sq.in.)						
*4. MEASUREMENT SKILLS						
* Linear measurement						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
* Area measurement							
* Volume measurement							
* Angular measurement							
5. UNITS OF MEASUREMENT							
* Specialized in vocational area (horsepower, bushels, acres)							
* Metric							
* English							
* Format--Decimals (1.34 inches, 0.112 acres)							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
- Conversion within same system (4 cups = quart)							
C. COMMUNICATIONS							
1. TECHNICAL WRITING							
- Proposals (bids, budgets)							
- Funding (balance sheets, reconcile bank statement)							
- Research (charts, graphs)							
- Data presentation/collection format (field data)							
- Collation							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
- Cumulative review (annual report)							
2. EXTENDED PROJECT - long term problem solving project and formal report							
*3. READING AND INTERPRETATION							
* Charts (diagrams, flow charts, schematics)							
* Graphs (bar graphs, pie graphs)							
* Data (tables)							
* Spread Sheets (simple or limited) (data table/summary)							
*4. ORAL COMMUNICATION							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
* Use of correct terminology						
* Ability to follow instructions (orally and written)						
D. BASIC COMPUTATIONAL SKILLS						
*1. COMPUTATION (Four basic functions)						
* Pencil & paper						
* Calculator						
* Mental						
* Estimation						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
* Development of a "feel" for reasonableness							
* Computer							
* Significant figures							
* Choosing an appropriate method (appropriate operation, appropriate tool)							
*2. FRACTIONS, PERCENTS AND DECIMALS							
* Use of fractions, percent and decimals							
* Identification of when each is appropriate							
* Use in formulae							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
* Skill reinforcement							
*3. MONEY PROBLEMS							
* Hourly wage							
* Piece wages							
* Commission							
* Taxes							
* Paycheck deductions							
* Purchasing and ordering							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
*4. EXTENDED CALCULATION SKILLS							
* Use of scientific notation							
* Logarithms							
* Use of trigonometric ratios to solve geometric problems							
* Complex numbers							
E. BASIC ALGEBRA SKILLS							
*1. FORMULAE							
* Identification of appropriate formulae							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS								
* Use of formulae by insertion of values								
* Development of knowledge which will aid in locating formulae								
2. ALGEBRA SKILLS								
- General review								
- Manipulation ($\frac{d}{t} = r \Rightarrow d = tr$)								
- Simultaneous solutions $\begin{array}{r} 2x + 3y = 9 \\ 3x - 3y = 11 \\ \hline 5x \quad\quad = 20 \end{array}$								
- Use of matrices								
*3. EXPONENTIATION								

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
* Basic concepts $(X^2)^3 = X^6$						
* Use in formulae						
F. PROBABILITY AND STATISTICS						
*1. BASIC PROBABILITY AND STATISTICS						
* Averages						
* Chance of event (probability of event happening--3 out of 4 times)						
* Sampling						
* Data reliability						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
* Mean, median, mode						
2. ANALYSIS						
- Diagramming & counting procedures for sample spaces						
- Permutations and combinations						
- Interpolations and extrapulations						
- Inferences						
- Measures of central tendency and dispersion						
G. BASIC GEOMETRY SKILLS						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
*1. INFORMAL GEOMETRY						
* Area of regular shapes						
* Identification of regular shapes						
* Vocational/mathematical terminology (barrel as opposed to cylinder)						
* Basic properties						
* Transformations - effect on apparent shape						
* Visualization - construction of models						
* Blueprinting						

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
2. EXTENDED GEOMETRY SKILLS							
- Modeling							
- Similarity and congruence							
- Indirect measurement and Pythagorean formula							
- Coordinate geometry							
H. REASONING							
*1. PROBLEM SOLVING							
* Techniques							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS							
* Materials							
*2. CRITICAL THINKING							
* Techniques							
* Materials							
3. ANALYSIS							
- Data -- Patterns and rules							
-- Interpolation							
-- Extrapolation							

B. MATH EQUIVALENCY CHECKLIST

MATH TOPICS						
- Curves -- Analyze graph to determine relation between variables						
-- Interpolation						
-- Extrapolation						
4. ADVERTISING						
- Direct and indirect method						
- Goodwill						

A.C.S. Software. Ag Math Tutor. Ag Computer Services, 21004 Molalla Avenue, Oregon City, OR 97045.
Software designed specifically for use in Vocational Agriculture program.

Basic Instructional Mathematics. 1982. Research and Curriculum Unit, Vocational Technical Education, College of Education, Drawer DX, Mississippi State, Miss. 39762.
A variety of basic mathematics problems.

Calter, Paul. Technical Mathematics. Prentice Hall, 1983.
Many useful problems in the text for teaching a course of technical mathematics. Leans a little too much toward traditional courses in presentation of material.

Coordinated Vocational-Academic Education. Academic Teacher's Guide and Student Resource Manual (Math). 1976. Educational Personnel Development Consortium, P.O. Box 1300, Richardson, Texas 75080. Printed by: Occupational Curriculum Laboratory, Department of Secondary and Higher Education, East Texas State University, Commerce, Texas 75428.
Identifies a variety of problems, very useful for academic and vocational teachers.

Daly, Judith, Monica McAlister and Millicent McNearney. Vocational Math Applications. New Jersey Vocational-Technical Curriculum Laboratory, New Jersey Department of Education, Rutgers State University, Building 4103-Kilmer Campus, New Brunswick, New Jersey 08903.

Delmar Publishers. Practical Problems in Mathematics for:
(This series of books is by a variety of authors.)
Automotive Technicians. George Moore, 1979.
Carpenters. Harry Huth, 1979.
Electricians. Crawford Garrard, Frank Boyd, 1980.
Electronics Technicians. Richard Sullivan, 1982.
Machinists. Edward Hoffman.
Mason. John Ball, 1973.
Metric System. Frank Schell, 1980.
Plumbers and Pipe Fitters. Benedict & Bartholemew D'Arcangelo, 1973.
Printing Trades. Adolph J. Schabel, 1956.
Sheet Metal Technicians. Fred Schumacker, 1973.
Welders. Frank Schell, Bill Matlock, 1982.
These books provide a variety of problems and applications. They provide an excellent resource for both vocational and math teachers.

Generalizable Mathematics Skills Assessment. User Manual. 1984. Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section. James P. Greenan, Principal Investigator.
Very useful in the development of project materials.

Gerardi, William and William Jones. Essential Mathematics. Harcourt Brace Jovanovich, 1983.
Mostly numerical computation and repetitive exercises.

Glenn, Euel and David Whiltsie. Success in Mathematics. Motivation Development Inc., 1981.
No problems, mostly drill.

Gossage, Loyce C. Mathematics Skill Builder. South-Western Publishing Company, 1985. Cincinnati, Ohio.
For business classes; provides an excellent review and stresses self-improvement.

Keedy, Mervin, Stanley Smith and Paul Anderson. Applying Mathematics. Addison Wesley, 1983.
A few good problems.

Lyng, Merwin J., L.J. Meconi and Earl J. Zwick. Career Mathematics: Industry and the Trades.
Houghton Mifflin Co., 1977.
A few useful problems, but largely numerical drill.

Martinka, Marie and James L. Southam. Vocational Mathematics for Business. South-Western Publishing Company, 3rd Edition, 1984, Cincinnati, Ohio.
A text-workbook for fundamental business mathematics.

Moore, Claude, Bennie Griffin and Edward Polhamus Jr. Applied Mathematics for Technicians. Prentice Hall, 1982.
Algebra is done in too much depth, not enough is covered in geometry. A few good problems.

National Council of Teachers of Mathematics. Applications in School Mathematics - 1979 Yearbook.
Excellent source of suggestions that apply in most areas.

Oregon Vo-Tech Mathematics Problem Sets. Oregon Department of Education. 1974.
A set of booklets, each dealing with mathematics in a vocational/industrial/technical area.

Aviation Mechanics	Diesel Mechanics	Forestry	Nursing
Auto Mechanics	Drafting	Industrial Mechanics	Police Science
Agriculture	Electronics	Machine Tool	Waste Water Technology
Clerical	Fire Science	Marketing	Wood Products
Construction	Food Processing		Welding

These booklets present useful problems for inclusion in either vocational or math classes.

Pachucki, Chester. Mathematics for Industrial Technicians. Prentice-Hall, 1974.
Essentially a traditional approach.

Peterson, John, and William deKryger. Mathematics for the Automotive Trade. South-Western Publishing Co., 1983.
Practical problems, but much of the book is devoted to drill, especially in computation.

Pouler, Wilfred B. Printing Reading for the Machine Trades. South-Western Publishing, 1984.
Highly technical and job oriented textbook. It provides some useful exercises for visualization.

RECSAM Participants. Mathematics for Vocational Students. RECSAM Conference, April 12-June 24, 1976.
A few useful problems. Could be useful as source of extended problems.

Rice, Eric. Basic Measurement. CONSERVA, Inc. 1982. Raleigh, North Carolina.
Apprentice related training modules.

Saunders, Hal. When Are We Ever Gonna Have To Use This? Dale Seymour Publications, 1981.
An excellent source of problems.

Shaw, Bryce and Robert Kramer. Fundamentals of Mathematics - Skills and Applications. Houghton Mifflin, 1982.
Mostly drill, not application.

Smith, Robert D. Vocational Technical Mathematics. Delmar Publishers Inc., 1983.
This text covers some topic strands; exercises, mostly word problems, are found in standard math books.

Spetz, Sally H. Basic Mathematics. CONSERVA, INC. 1982. Raleigh, North Carolina.
Apprentice related training modules.

Trade Math. Lane Community College, 1981. LCC Downtown Center, 1059 Willamette Street, Eugene, OR 97401.
Apprentice related training modules. Instructor's guides and student training modules.

Wiltsie, David. Vocational Mathematics Series. Motivation Development Inc., 1982.
Book 1 Fractions, Decimals, Per Cents.
Book 2 Metric and US Systems of Measurement.
Book 3 Practical Uses for Formulas and Equations.
Book 4 Mathematics of Geometric Shapes and Equations.
Book 5 Machine Mathematics (Gears, Pulleys, and Levers).
Book 6 Carpentry Mathematics.
Book 7 Working with Electric Circuits.
Book 8 Mathematics for Shoppers and Salespeople.
Book 9 Mathematics for Employment and Business.

These books provide excellent materials for use in vocational programs and/or applied mathematics courses.

VI. APPENDICES

A. Example Page of Matrix Showing Applications by Courses

B. Example Page of Matrix Showing Applications by Program Area

C. Matrix Showing Math Applications by Content Units in Replication Programs

D. Equivalency Credit Application

E. Notice to Staff Regarding Student Registration Procedures

MATH EQUIVALENCY CHECKLIST

MATH TOPICS 0 = Not applicable 1 = Applicable, but not being taught 2 = Taught, but minimum depth and regularity 3 = Taught, maximum depth	ACCOUNTING			OFFICE OCCUPATIONS				DRAFTING				
	ACCOUNTING I	ACCOUNTING II	ACCOUNTING III	BUSINESS MACHINES	ACCOUNTING (1 semester) or	RECORDKEEPING	OFFICE PROCEDURES	DRAFTING I	DRAFTING II	DRAFTING III	DRAFTING IV (CAD)	ARCHITECTURAL DRAFTING
* A. BASIC ARITHMETIC SKILLS												
*1. WHOLE NUMBERS												
* Add	3	3	3	3	3	3	3	3	3	3	3	3
* Subtract	3	3	3	3	3	3	3	3	3	3	3	3
* Multiply	3	3	3	3	3	3	3	3	3	3	3	3
* Divide	3	3	3	3	3	3	3	3	3	3	3	3
*2. FRACTIONS												
* Add	3	3	3	3	3	3	3	3	3	3	3	3

MATH TOPICS	ACCOUNTING	OFFICE OCCUPATIONS	DRAFTING
* Find what percent is a number of the whole	2	3	2
*5. FRACTION/DECIMAL/PERCENT			
* Change fraction to decimal	2	2	3
* Change fraction to percent	2	2	2
* Change decimal to fraction	2	2	3
* Change decimal to percent	2	2	2
* Change percent to fraction	2	2	2
* Change percent to decimal	2	3	3
*6. ORDER AND EQUALITY RELATIONS			
* Equivalent	3	3	0
* Greater than	2	2	0

APPENDIX C

MATH APPLICATIONS BY CONTENT UNIT

- MECHANICS
- CONSUMER HOMEMAKING
- WOODS/METALS
- ELECTRICITY/ELECTRONICS

MATRIX SHOWING MATH APPLICATIONS BY CONTENT UNITS IN REPLICATION PROGRAMS APPENDIX C

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
* A. BASIC ARITHMETIC SKILLS		KEY: F=Foods C=Child Care S=Sewing L=Living/Own		Applications in this area are found in all levels of the four-
*1. WHOLE NUMBERS	Timing (Also degrees) Grade averages Engine rebuilding	(F) Measurement Tech. (C) Teaching Math to Children (L) Family Budgets	Statements Board Feet Cost Estimating Shop Bill Work Orders Shop Orders	year sequence of the electronics.Examples: - Ohms Law - Watts Law - Lenzes Law - Inductance - Capacitance
*2. FRACTIONS	Cylinder displacement Place valve	(F/C) Understanding Recipes (F/C) Increasing/ Decreasing Recipe (S) Amount of fabric	Measurements Dimensioning Proportions Building to scale	
*3. DECIMALS	Micrometer readings Brakes Displacements Tolerances	(F) Budgeting for Foods (C) Spending Budgeted Allocations (L/ S) Figuring Costs of Products/Garments	Cost Estimating Shop Bill Work Orders Statements	
*4. PERCENT	Ratio Coolant system	(L) Family Budgeting (C) National, State, Local Data (F/ L) Dietary Require- ments	Mark-up Cutting Loss	Percentage of error Percent of amplifica- tion

MATRIX SHOWING MATH APPLICATIONS BY CONTENT UNITS IN REPLICATION PROGRAMS APPENDIX C

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
*5. FRACTION/DECIMAL/PERCENT	Setting points Coolants Test instruments Drill sizes Engine efficiency Purchasing Compression ratio Anti-freeze dilution Sizing cylinders	(L) Food Budgets	Conversion	Ohms Law Watts Law Lenzes Law Inductance Capacitance
*6. ORDER AND EQUALITY RELATIONS	Engine rebuilding Tolerance limits Alignment	(F,C) Dietary/ Nutrition (F,C) Ingredient Substitution (S) Amount of Fabric for Different Widths	Net Measurement Gross Measurement Kerf	Output power over input
7. INTEGERS	Specifications Oversize pistons Alignment Boring and overhauls		Shelf spacing in cabinetry Hanging Doors	
8. IRRATIONAL & COMPLEX NUMBERS	Cylinder displacement Brakes		Curve Formulaes	

MATRIX SHOWING MATH APPLICATIONS BY CONTENT UNITS IN REPLICATION PROGRAMS APPENDIX C

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
B. MEASUREMENT				
*1. MEASUREMENT TOOLS	Dial indicator Cup/gallon/liters Autobody tools Ampmeter/voltmeters Compass Divider Ruler Depth Gauge Vacuum Gauge Tongue Wrench	(C/F) Cups, spoons, volume, weight, thermometer (S/L) Tape measure, yardstick, ruler, compass	Steel Scale T Bevel Dividers Compass Plumb Bob Level Steel Tape Bench Rule Chalk Line Awl Try Square	Digital meters Oscilloscope Inductance meter Ohm meter VOM meter VTVM meter
2. EXTENDED MEASUREMENT TOOLS	Specifications	(F) Computer/Recipes (C) Computer/Tutorials (S) Computer/Careers (L) Comp/Furniture		Specifications
*3. APPROXIMATION	Estimation	(F, C, S, L): Measurement Calculation Estimating costs, Fabic Yield	Hand measurement Pacing Round-ups	Estimate and prove outcomes

MATRIX SHOWING MATH APPLICATIONS BY CONTENT UNITS IN REPLICATION PROGRAMS APPENDIX C

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
*4. MEASUREMENT SKILLS	Micrometer Crankshaft Borer Brake Cylinders Float level Brake surface Drill Cam lobe Timing Tape	(S) Fabric (L)Fumiture for fit in rooms (F)Volume (liquid,dry) (C)Height, weight of Children (C)Charts, graphs	Project Design/ Plan Cost Estimation Dimensional Lumber Table Saw Work Jointer Work Coopering Band Saw Work	Digital meters Oscilloscope Inductance meter Ohm meter VOM meter VTVM meter
5. UNITS OF MEASUREMENT	Horsepower Torque Problems Eccentricity Volume Displacement Thread pitch Temperature	(S) Pins, needles, buttons (L) Reading meters/ understanding bills (C) Teaching children to count; measuring children, converting inches to feet. (F) Recipe conversion	Board Feet Sizes of Fasteners	Volts Amps Watts Henry's Fariads Gain

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MATRIX SHOWING MATH APPLICATIONS BY CONTENT UNITS IN REPLICATION PROGRAMS

APPENDIX C

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
C. COMMUNICATIONS				
1. TECHNICAL WRITING	Parts lists Statement of charges Composition of brake fluid Price comparison Tune-up specifications Torque specifications Sheets	(L,C.F,S): Price Comparisons Collect/interpret Data (L) Organize Notebooks	Work Order Sketching Weekly Log Term Summary	Maintaining lab notebooks
2. EXTENDED PROJECT - long term problem solving project and formal report	Engine overhaul	(C) Collect/interp. data for proj. "Setting Up Your Own Child Care Services"	Advanced Woods Project Final Experience for Rec.Woods	Semester project required in all classes
*3. READING AND INTERPRETATION		(F,C) Minimum daily dietary requirements (C) Cost of raising a child (L) Taxes (charts)	Size Conversion Charts Blueprints Mass Production	Decisions are made based on reading and interpretation of data: graphs, charts, other data
*4. ORAL COMMUNICATION	PSI Torque	(L,C,F,S): Conversions Measurements Teaching others	Trade Terms Oral Project Report Safety Procedures	Mathematics/ Electronics terminology

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
D. BASIC COMPUTATIONAL SKILLS				
*1. COMPUTATION (Four basic functions)	Cost of repairs Savings on repairs Measurement Calculator	(F,S,L,C): Figuring costs (L) Calculator (F) Increase/Decrease Recipes	Board Feet Cost Estimates Statement Proper Tool Usage Safety Procedures	
*2. FRACTIONS, PERCENTS AND DECIMALS	Cooling system Parts discount Volume Area	(F,C,L,S): Managing Resources	Triangulation Board Foot Formula Square Foot Formula Percentage Formula Volume	
*3. MONEY PROBLEMS	Car care Bidding Total costs	(F,C,L,S): Wages Piece Wages	Cost Estimates Purchasing Ordering	
*4. EXTENDED CALCULATION SKILLS				Trig functions Pythagoras' Theorem

MATRIX SHOWING MATH APPLICATIONS BY CONTENT UNITS IN REPLICATION PROGRAMS

APPENDIX C

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
E. BASIC ALGEBRA SKILLS				
*1. FORMULAE	Areas Volumes Temperature	(L) Tax Unit	Triangulations Board Feet Square Feet Percentage ~~Volume~~	Inductance Capacitance Resonance Ohms Law ~~Watts Law~~
2. ALGEBRA SKILLS			Dimensional Analysis	All levels
*3. EXPONENTIAL NOTATION				Ohms Law Watts Law Inductance
F. PROBABILITY AND STATISTICS				
*1. BASIC PROBABILITY AND STATISTICS	Miles per gallon		Grading Projects	
2. ANALYSIS				
G. BASIC GEOMETRY SKILLS				

MATRIX SHOWING MATH APPLICATIONS BY CONTENT UNITS IN REPLICATION PROGRAMS

APPENDIX C

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
*1. INFORMAL GEOMETRY	Tires, treads Cylinders Crankshaft Cams Front end alignment PSI, CCC, HP Tolerance Torque Fahrenheit to Celsius Hydraulic to mechanical Gear ratio	(C) Shapes (L) Housing Unit (S) Patterns (F) Making forms out of food	Dovetail Rabbet Ogee Chamfer Coping Cove Groove Core Blueprint Reading Mock-up	All theorems provide applications in this area.
2. EXTENDED GEOMETRY SKILLS	Reading scope		Models Templates Jigs Scales	Reading scope
H. REASONING				
*1. PROBLEM SOLVING	Tables Charts Diagnosis	(L,S,C,F): Determine mathematical Techniques to Solve Problems	Function/Form Analysis Alternative use of tools, materials and finishes Cost Analysis	Applications at all levels
*2. CRITICAL THINKING	Car Care	(S) Pattern Alteration/fitting		Applications at all levels

MATRIX SHOWING MATH APPLICATIONS BY CONTENT UNITS IN REPLICATION PROGRAMS APPENDIX C

MATH TOPICS	CONTENT UNITS IN WHICH MATH TOPICS ARE COVERED			
	MECHANICS	CONSUMER HOMEMAKING	WOODS	ELECTRICITY/ELEC.
3. ANALYSIS	Sun scope Voltage	(F) Appropriate Size/ Containers (S) Sizing of Patterns		Voltage measurement Resistance measurement
4. ADVERTISING			Benton County Home Show Winter Wood Project Sale	

APPENDIX D

CORVALLIS SCHOOL DISTRICT 509J

Equivalency Credit Application

Name_____ Date_____

School_____

1. Proposed equivalent course sequence:

   _____

2. Department for which the equivalent credit will apply (i.e., math, English, science):

   _____

3. Provide the specific high school graduation requirements this course will fulfill.

   _____

   _____

   _____

4. Complete course equivalency checklist, i.e. math, science, English. Attach course curriculum, outlines of courses in sequence).

   _____

   _____

   _____

5. List department(s) and individual(s) with which this application was discussed.

   _____

   _____

   _____

Completed application form must be turned in to the building principal by November 30.

BULLETIN SENT OUT IN FALL DURING PREPARATION FOR SECOND SEMESTER SCHEDULING

TO: NOEL STUBBS (Drafting)
JOAN JURGENSEN (Office Occupations)
Cherry Baker (Home Economics)
Reed King (Auto Mechanics)
Dick Green (Rec. Woods)
Les Whittle (Accounting)
Lew Williams (Electricity-Electronics)

FROM: Counseling Staff, Corvallis High School

RE: Registering for Integrated Vocational Mathematics

Please remind your advanced students that if they are planning to take a math credit under the Integrated Vocational Mathematics Plan (fourth semester optional math credit) to show the appropriate course title and number on their class request forms.

Please keep your own list of these students.

INTEGRATED VOCATIONAL MATH

Math/Drafting	Course #255
Math/Office Occupations	Course #133
Math/Accounting	Course #126
Math/Home Economics	Course #235
Math/Auto Mechanics	Course #275
Math/Electricity-Electronics	Course #282
Math/Rec Woods	Course #263

When you receive a printout of students for your classes, please verify that each student who has enrolled in the Integrated Vocational Math Program is qualified. (They must have had the required preceding course credits). Please make additions or deletions to the list and send a corrected copy to the Counseling Center for computer correction.

If you have questions about whether or not a student is qualified, please see the appropriate counselor:

A - D	Bryan
E - K	Bottjer
L - Q	Mackey
R - Z	McGauhey